

What is claimed is:

- 1 1. A dispersant-viscosity improver composition for lubricating oil compositions
2 comprising the reaction product of reactants comprising
 - 3 (a) a hydrocarbon polymer grafted with an α,β -ethylenically unsaturated
4 carboxylic acid or functional derivative thereof; and
 - 5 (b) an amine selected from the group consisting of
 - 6 (b-1) a polyamine product having at least one condensable primary or
7 secondary amino group, made by contacting at least one hydroxy-containing
8 material (b-i) having the general formula
$$(R)_n Y_z — X_p — (A(OH)_q)_m \quad (I)$$
wherein each R is independently H or hydrocarbon based group, Y is selected from the group consisting of O, N, and S, X is a polyvalent hydrocarbon based group, A is a polyvalent hydrocarbon based group, n is 1 or 2, z is 0 or 1, p is 0 or 1, q ranges from 1 to about 10, and m is a number ranging from 1 to about 10; with (b-ii) at least one amine having at least one N-H group, and
 - 15 (b-2) an acylated derivative of (b-1) containing at least one condensable
16 N-H group, and optionally,
 - 17 (c) at least one hydrocarbon group substituted carboxylic acid or anhydride.

- 1 2. The composition of claim 1 wherein the reactants further comprise (d) at
2 least one preformed polyester containing at least one condensable hydroxyl group.

- 1 3. The composition of claim 1 wherein the hydrocarbon polymer is selected
2 from the group consisting of
 - 3 (1) hydrogenated polymers of dienes;
 - 4 (2) hydrogenated copolymers of a conjugated diene with one or more vinyl
5 substituted aromatic compounds;
 - 6 (3) polymers of alpha olefins containing from 2 to about 28 carbon atoms;

- 7 (4) olefin-diene copolymers; and
8 (5) star polymers.

1 4. The composition of claim 3 wherein the hydrocarbon polymer is (1) a
2 hydrogenated polymer of dienes, wherein the diene is a conjugated diene selected
3 from the group consisting of isoprene, butadiene, and piperylene.

1 5. The composition of claim 3 wherein the hydrocarbon polymer is (2) a
2 hydrogenated copolymer of a conjugated diene with a vinyl substituted aromatic
3 compound wherein the vinyl substituted aromatic compound is a styrenic monomer.

1 6. The composition of claim 3 wherein the hydrocarbon polymer is (2) a
2 hydrogenated copolymer of a conjugated diene with a vinyl substituted aromatic
3 compound wherein the diene is selected from the group consisting of isoprene,
4 butadiene, and piperylene

1 7. The composition of claim 5 wherein the diene is selected from the group
2 consisting of isoprene and 1,3-butadiene and the styrenic monomer is styrene.

1 8. The composition of claim 7 wherein the hydrocarbon polymer is a block
2 copolymer.

1 9. The composition of claim 3 wherein the hydrocarbon polymer is (3) a
2 copolymer of aliphatic olefins containing from 2 to about 28 carbon atoms wherein
3 one olefin is ethylene.

1 10. The composition of claim 9 wherein the hydrocarbon polymer is an ethylene-
2 propylene copolymer.

- 1 11. The composition of claim 3 wherein the hydrocarbon polymer is (4) an
2 olefin-diene copolymer wherein the olefin comprises ethylene and propylene and the
3 diene is a non-conjugated diene.
- 1 12. The composition of claim 3 wherein the hydrocarbon polymer is (4) an
2 olefin-diene copolymer wherein the diene is a conjugated diene.
- 1 13. The composition of claim 11 wherein the diene is selected from the group
2 consisting of 1,4-hexadiene, dicyclopentadiene, ethyldene norbornene, vinyl
3 norbornene, and 4-vinyl cyclohexene.
- 1 14. The composition of claim 3 wherein the hydrocarbon polymer is (5) a star
2 polymer wherein the arms are derived from dienes, wherein the diene moieties are
3 substantially hydrogenated.
- 1 15. The composition of claim 14 wherein the star polymer comprises arms of
2 polymers of dienes and vinyl substituted aromatic compounds.
- 1 16. The composition of claim 1 wherein the hydrocarbon polymer has a number
2 average molecular weight ranging from about 20,000 to about 500,000.
- 1 17. The composition of claim 1 wherein the ethylenically unsaturated carboxylic
2 acid or functional derivative thereof, is an α,β - unsaturated carboxylic acid or
3 functional derivative thereof containing from 2 to about 20 carbon atoms exclusive of
4 carbonyl carbons.
- 1 18. The composition of claim 17 wherein the ethylenically unsaturated carboxylic
2 acid or functional derivative thereof, comprises at least one member of the group
3 consisting of maleic acid, maleic anhydride, fumaric acid, itaconic acid and itaconic
4 anhydride and esters of the acids.

1 19. The composition of claim 1 wherein grafting of the hydrocarbon copolymer is
2 conducted at about 80°C to about 200°C in the presence of a free radical initiator.

1 20. The composition of claim 1 wherein the reactants comprise
2 (a) a hydrocarbon polymer grafted with an α,β -ethylenically unsaturated
3 carboxylic acid or functional derivative thereof;
4 (b-1) a polyamine product having at least one condensable primary or
5 secondary amino group, made by contacting at least one hydroxy-containing material
6 (b-i) having the general formula



7 wherein each R is independently H or hydrocarbon based group, Y is selected from the
8 group consisting of O, N, and S, X is a polyvalent hydrocarbon based group, A is a
9 polyvalent hydrocarbon based group, n is 1 or 2, z is 0 or 1, p is 0 or 1, q ranges from 1
10 to about 10, and m is a number ranging from 1 to about 10; with (b-ii) at least one
11 amine having at least one N—H group; and
12

13 (c) at least one hydrocarbon group substituted carboxylic acid or anhydride.

1 21. The composition of claim 1 wherein the amine is (b-1) the polyamine product
2 and the grafted copolymer (a) is characterized by the presence of less than 2 moles of
3 grafted carboxylic acid or functional derivative thereof per equivalent of hydrocarbon
4 polymer.

1 22. The composition of claim 1 wherein the polyamine product (b-1) contains from
2 about 0.1 to about 20% by weight of H₂O and further contains from about 0.05 to
3 about 1% by weight of phosphorus.

1 23. The composition of claim 1 wherein the hydroxy-containing material (b-i)
2 contains from 1 to about 10 hydroxy groups.

1 24. The composition of claim 1 wherein the hydroxy-containing material (b-i) is
2 selected from the group consisting of glycerol, polyglycerols, ethylene glycol,
3 ethanolamine, diethanolamine, tris-(hydroxymethyl)aminomethane, 2-amino-2-
4 methyl-1,3-propanediol, ethoxylated polyamines, and polyoxyalkylene glycols.

1 25. The composition of claim 1 wherein the amine (b-ii) is an alkylene polyamine.

1 26. The composition of claim 25 wherein the alkylene polyamine is selected from
2 the group consisting of ethylene polyamines, ethylene polyamine bottoms, and
3 polyoxyalkylene polyamines.

1 27. The composition of claim 24 wherein the hydroxy containing material (b-i) is
2 tris-(hydroxymethyl)aminomethane.

1 28. The composition of claim 1 wherein the amine (b) is (b-2), the acylated
2 derivative of (b-1) containing at least one condensable N-H group.

1 29. The composition of claim 28 wherein the polyamine product (b-1) contains
2 from about 0.1 to about 20% by weight H₂O and further contains from 0.05 to about
3 1% by weight of phosphorus.

1 30. The composition of claim 28 wherein (b-2) is the product obtained by reacting
2 the polyamine product (b-1) with a carboxylic acid acylating agent.

1 31. The composition of claim 30 wherein the carboxylic acid acylating agent is a
2 hydrocarbyl substituted succinic acid or anhydride.

1 32. The composition of claim 28 wherein the hydrocarbyl substituent is an
2 aliphatic group containing from about 30 to about 200 carbon atoms.

- 1 33. The composition of claim 30 wherein the carboxylic acylating agent is
2 characterized by the presence within its structure of from about 0.8 to about 2.0
3 succinic groups per hydrocarbyl substituent.
- 1 34. The composition of claim 30 wherein the carboxylic acid acylating agent is a
2 monocarboxylic acid containing from about 8 to about 28 carbon atoms.
- 1 35. The composition of claim 1 further containing boron.
- 1 36. An additive concentrate comprising an inert normally liquid organic diluent
2 and from about 4 to about 40 percent by weight of the composition of claim 1.
- 1 37. A lubricating composition comprising a major amount of an oil of lubricating
2 viscosity and a minor amount of the composition of claim 1.
- 1 38. The additive concentrate of claim 36 further comprising from about 1% to
2 about 10% by weight of at least one pour point depressant selected from the group
3 consisting of polyacrylates, alkylated naphthalenes, styrene/alkyl maleate, and
4 fumarate- and maleate ester/vinyl acetate copolymers.
- 1 39. A lubricating composition comprising a major amount of an oil of lubricating
2 viscosity and a minor amount of the additive concentrate of claim 36.
- 1 40. The lubricating composition of claim 37 wherein the oil of lubricating
2 viscosity is a synthetic oil.
- 1 41. The lubricating composition of claim 37 wherein the oil of lubricating
2 viscosity is a mineral oil.

1 42. The lubricating composition of claim 40 wherein the synthetic oil is a
2 polyalphaolefin oil.

1 43. The lubricating composition of claim 41 wherein the mineral oil is a
2 hydrotreated oil.

1 44. The lubricating composition of claim 37 wherein the oil of lubricating
2 viscosity comprises a mixture of mineral oil and synthetic oil.